UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/813,255	03/20/2001	Patrick Todd Haugen	ROC920000302US1	1709

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EXAMINER
KENDALL, CHUCK O

ART UNIT	PAPER NUMBER
2122	2

DATE MAILED: 11/05/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

	Application No.	Applicant(s)
Office Action Summary	09/813,255	HAUGEN ET AL.
	Examiner	**Art Unit**	
	Chuck O Kendall	2122	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>20 March 2001</u> .

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-26 is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

    If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☐ Some * c)☐ None of:

        1.☐ Certified copies of the priority documents have been received.

        2.☐ Certified copies of the priority documents have been received in Application No. _____ .

        3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

    a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .

4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: .

DETAILED ACTION

1. This action is in response to the application filed 03/20/01.

2. Claims 1-26 have been examined.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1 - 6, 9 -22, 25 and 26 are rejected under 35 U.S.C. 103(a) as being

unpatentable over over Blainey USPN 6,045,585 in view of Archambault USPN

6,173,4444 B1.

Regarding claim 1, Blainey discloses a method for performing alias refinement,

the method comprising:

determining whether a load of an address exists for a variable in an intermediate

representation of a source code (Col.9 lines 20-25 [9:20-25], see determining alias

information for inter-compilation unit level, also see 1:45-50, for alias information which

is noted in the prior art to be symbol or storage location or variable), determining, if the

load of the address exists for the variable, whether each use of the address is for an

indirect reference to the variable (5:30-35, see aliasing unmapped symbol (variable),

and storage locations (address) through pointer indirection), and removing if all uses of

the address are for an indirect reference to the variable, the variable from an address

taken alias set used with the intermediate representation (4:38-43). Blainey doesn't

explicitly disclose replacing, if a particular use of the address is for an indirect reference to the variable, the indirect reference in the intermediate representation with a direct reference to the variable. However, Archambault does disclose this feature (6:15-20, also refer to 5:40-45, for indirect call points (references) and r-val). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine Blainey and Archambault because, replacing the indirect reference with a direct reference "results in a much smaller alias set because a number of the pessimistic redundancies have been removed" Archambault, 6: 65-67.

Regarding claim 2, the method of claim 1 wherein the address load determining, the use determining and replacing is repeated for each instruction in the intermediate representation (fig, 5, item # 116, and 120).

Regarding claim 3, Blainey discloses all the claimed limitation as applied in claim 1 above as well as removing, if one use of the address involves no indirect reference, the variable from the candidate list (Blainey, 4:39-46). Blainey doesn't explicitly disclose creating a candidate list for the intermediate representation, where the candidate list contains the variable that requires the load of the address for the variable in the intermediate representation. However, Archambault does disclose this feature (Archambault, 4:59-65). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine Blainey and Archambault because, the intermediate representation list makes referencing variables and address more structured and helps check redundancies.

Regarding claim 4, the method of claim 3 wherein the variable remaining on the candidate list is removed from the address taken alias set (Archambault, 7:4:10).

Regarding claim 5, the method of claim 1 wherein the use of the address is represented with a pointer variable (Archambault, 7:4:10).

Regarding claim 6, the method of claim 1 wherein the use of the address is represented in the intermediate representation with a load address command and a load of a value pointed by a pointer variable.

Regarding claim 9, the method of claim 1 wherein the use determining comprises:

propagating the uses of the address in the intermediate representation (Blainey, 5:62-67).

Regarding claim 10, the method of claim 1 further comprising:

generating, after the replacing and the removing, the object code from the intermediate representation using the alias set (Blainey, 3: 40-45) ; and

executing the object code (fig 4, [30], [34] shows object linked to executable [42] and).

Regarding claims 11 and 12, Blainey discloses a method for performing alias refinement, the method comprising:

determining whether a load of an address exists for a variable in an intermediate representation of a source code (Col.9 lines 20-25 [9:20-25], see determining alias information for inter-compilation unit level, also see 1:45-50, for alias information which is noted in the prior art to be symbol or storage location or variable), determining, if the load of the address exists for the variable, whether each use of the address is for an indirect reference to the variable (5:30-35, see aliasing unmapped symbol (variable), and storage locations (address) through pointer indirection), and removing if all uses of the address are for an indirect reference to the variable, the variable from an address taken alias set used with the intermediate representation (4:38-43). Blainey doesn't explicitly disclose replacing, if a particular use of the address is for an indirect reference to the variable, the indirect reference in the intermediate representation with a direct reference to the variable. However, Archambault does disclose this feature (6:15-20, also refer to 5:40-45, for indirect call points (references) and r-val). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine Blainey and Archambault because, replacing the indirect reference with a direct reference "results in a much smaller alias set because a number of the pessimistic redundancies have been removed" Archambault, 6: 65-67.

Regarding claim 12, Examiner is applying the same rationale to claim, which is the apparatus (for apparatus as mapped see, Blainey Col. 11, line 11 - Col. 12, line 8) version of the method claim as discussed in claim 1 above.

Regarding claim 13, Examiner is applying the same rationale to claim, which is the apparatus (for apparatus as mapped see, Blainey Col. 11, line 11 - Col. 12, line 8) version of the method claim as discussed in claim 2 above.

Regarding claim 14, Examiner is applying the same rationale to claim, which is the apparatus (for apparatus see, Blainey Col. 11, line 11 - Col. 12, line 8) version of the method claim as discussed in claim 3 above.

Regarding claim 15, Examiner is applying the same rationale to claim, which is the apparatus (for apparatus see, Blainey Col. 11, line 11 - Col. 12, line 8) version of the method claim as discussed in claim 4 above.

Regarding claim 16, Examiner is applying the same rationale to claim, which is the apparatus (for apparatus see, Blainey Col. 11, line 11 - Col. 12, line 8) version of the method claim as discussed in claim 10 above.

Regarding claim 17, Examiner is applying the same rationale to claim, which is the computer readable medium, (for computer readable medium see, Blainey Col. 11, line 11 - Col. 12, line 8) version of the method claim as discussed in claim 1 above.

Regarding claim 18, Examiner is applying the same rationale to claim, which is the computer readable medium, (for computer readable medium see, Blainey Col. 11, line 11 - Col. 12, line 8) version of the method claim as discussed in claim 2 above.

Regarding claim 19, Examiner is applying the same rationale to claim, which is the computer readable medium, (for computer readable medium see, Blainey Col. 11, line 11 - Col. 12, line 8) version of the method claim as discussed in claim 3 above.

Regarding claim 20, Examiner is applying the same rationale to claim, which is the computer readable medium, (for computer readable medium see, Blainey Col. 11, line 11 - Col. 12, line 8) version of the method claim as discussed in claim 4 above.

Regarding claim 21, Examiner is applying the same rationale to claim, which is the computer readable medium, (for computer readable medium see, Blainey Col. 11, line 11 - Col. 12, line 8) version of the method claim as discussed in claim 5 above.

Regarding claim 22, Examiner is applying the same rationale to claim, which is the computer readable medium, (for computer readable medium see, Blainey Col. 11, line 11 - Col. 12, line 8) version of the method claim as discussed in claim 6 above.

Regarding claim 25, Examiner is applying the same rationale to claim, which is the computer readable medium, (for computer readable medium see, Blainey Col. 11, line 11 - Col. 12, line 8) version of the method claim as discussed in claim 9 above.

Regarding claim 26, Examiner is applying the same rationale to claim, which is the computer readable medium, (for computer readable medium see, Blainey Col. 11, line 11 - Col. 12, line 8) version of the method claim as discussed in claim 10 above.

5. Claims 7,8,23, and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Blainey USPN 6,045,585 in view of Archambault USPN 6,173,4444 B1 as applied in claim 1, and further in view of Lichtenstein et al. USPN 6,077,311 (hereinafter Lichtenstein).

Regarding claim 7, Blainey as modified by Archambault disclose all the limitations as applied in claim 1 above. Neither Blainey nor Archambault discloses wherein the indirect reference in the intermediate representation comprises one of an indirect store of the variable to a memory and an indirect load of the variable from the memory. However, Lichtenstein does disclose this feature (Col. 10, lines 65 to Col. 11, lines 15). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine Blainey and Archambault because, using a load or store as an indirect references in the intermediate representation makes modifying and generating the intermediate representation more efficient (Lichtenstein, 10:49-55).

Regarding claim 8, the method of claim 1 wherein the indirect reference is a parameter in an inline procedure call (Lichtenstein, 10:48-33).

Regarding claim 23, Examiner is applying the same rationale to claim, which is the computer readable medium, (for computer readable medium see, Blainey Col. 11, line 11 - Col. 12, line 8) version of the method claim as discussed in claim 7 above.

Regarding claim 24, Examiner is applying the same rationale to claim, which is the computer readable medium, (for computer readable medium see, Blainey Col. 11, line 11 - Col. 12, line 8) version of the method claim as discussed in claim 8 above.

Correspondence Information

6.   Any inquires concerning this communication or earlier communications from the examiner should be directed to Chuck O. Kendall who may be reached via telephone at (703) 308-6608. The examiner can normally be reached Monday through Friday between 8:00 A.M. and 5:00 P.M. est.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tuan Dam *can be* reached at *(703) 305-4552.*

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is *(703) 305-3900.*

For facsimile (fax) send to 703-7467239 official and 703-7467240 draft

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